Of the 110 patients studied (75 men, 35 women), 109 (99·2%) were cured, with negative results to smears and cultures on at least two occasions after treatment (tables I and II). Side effects were mild and infrequent (3·6%). One treatment failure was identified among the 75 male patients. *Neisseria gonorrhoeae* was isolated on the ninth day at his second follow up examination, although smear and culture had given negative results at his first check up 48 hours after treatment. He emphatically denied re-exposure, but the culture isolate was sensitive to Augmentin and even to amoxycillin alone.

Isolates from 88 patients were tested for drug sensitivity; 22 isolates having failed to grow on subculture. One β-lactamase producing strain of *Neisseria gonorrhoeae* was isolated from a Nigerian patient in whom treatment was successful although the isolate was resistant to amoxycillin alone (MIC 32 mg/l.) One other isolate was resistant to amoxycillin (MIC 4 mg/l). The trial included a patient who had failed to respond to oral talampicillin 2 g and to intramuscular spectinomycin at a dosage of 4 g but was cured by Augmentin.

As only a single β-lactamase producing strain was isolated in this trial it is not possible to generalise about the effectiveness of Augmentin against such strains. We think that this combination drug is an ideal second line single dose oral medication for use where other forms or oral preparations have failed, especially as the incidence of β-lactamase producing and other resistant strains is increasingly reported.[1 2 4]

Yours faithfully,

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References

1. Ashford WA, Potts DW, Adams HJU *et al.* Spectinomycin resistant β-lactamase producing *Neisseria gonorrhoeae. Lancet* 1981; ii:1035-7.
2. Easmon LSF, Ison CA, Bellinger CM, Harris JW. Emergence of resistance after spectinomycin treatment for gonorrhoea due to β-lactamase producing strain of *Neisseria gonorrhoeae. Br Med J* 1982; **284**:1604-5.
3. Public Health Laboratory Service. Communicable disease surveillance 1981. *Communicable Diseases Report* 1983. (No 83/05).
4. Potterat JJ, King RD. A new approach to gonorrhea control. The asymptomatic man and incidence reduction. *JAMA* 1981; **245**:578-80.

TO THE EDITOR, *British Journal of Venereal Diseases*

A simple suggestion to distinguish between auxotypes of *Neisseria gonorrhoeae*

Sir,

Neisseria gonorrhoeae strains occur as natural auxotypes,[1 2] and at present auxotyping is probably the only practical tool for studies on the epidemiology of gonorrhoea. The method is based on the growth of clinical isolates in a series of synthetic media with different nutrients (specific requirements) added or removed.[3 4] A specific substrate requirement results from a block in its synthesis by the auxotypic strain. However, the specific nutrient required by an auxotype may also serve as an energy source in vivo if the organism's primary energy source is limited at the site of infection.[5 6] In vitro studies have shown that glutamate dehydrogenase can serve either catabolic or anabolic functions in the gonococcus depending on the availability of glucose.[7 8]

Previous data indicate that a proline requiring (pro$^-$) auxotype growing in a synthetic medium[4] requires about twice as much proline as a non-requiring (zero) auxotype by early log phase, and needs about four times as much proline for an equivalent level of growth by stationary phase (MA Chan and M Goldner, personal communication).

In view of these data, a pro$^-$ auxotype (HGH P5/79) and a zero auxotype (HGH Z5/79) were compared regarding the amount of carbon dioxide produced from the metabolism of proline and glucose. Classic Warburg respirometry[9] and the simple barium hydroxide indicator system of Slifkin and Pouchet[10] were adapted for the experiments. The organisms were cultured in GC broth with added supplement. Equivalent suspensions of washed log phase gonococci in buffered (pH 7·0) maintenance medium were then provided with a substrate for the metabolic studies. Warburg respirometry[9] verified the accuracy and reproducibility of the barium hydroxide indicator system.[10] The indicator system consisted of glass serum vials for the metabolic reactions and evacuated glass tubes (Vacutainer, Becton Dickinson, Rutherford, New Jersey, USA) containing a saturated solution of barium hydroxide. The gaseous contents of a serum vial were sampled by inserting an adapter needle to connect the vacutainer (containing barium hydroxide) with the reaction chamber for 10 minutes. The amount of barium carbonate precipitate formed was measured by its net absorbance (650 nm). (The net absorbance refers to the absorbance reading minus the combined endogenous and atmospheric readings for each determination). The contents of a particular vial were sampled only once in the course of the experiment.

The results indicated that the zero auxotype (HGH Z5/79) liberated approximately twice as much carbon dioxide as the pro$^-$ auxotype (HGH P5/79) when presented with glucose, while the pro$^-$ auxotype liberated appreciably more carbon dioxide when catabolising proline. Although the difference in glucose degradation by HGH P5/79 and HGH Z5/79 was considerable, we do not know whether this would differentiate between HGH Z5/79 and other non-zero auxotypes. As gonococci use two metabolic pathways in their metabolism of glucose,[11] it is possible that varying amounts of carbon dioxide are generated during glucose metabolism by different gonococcal isolates. Warburg respirometry confirmed the observations made using the barium hydroxide indicator system for the two strains. The major change seen was that the metabolic pattern for proline as opposed to glucose is consistently reversed for the two auxotypes. Thus the pro$^-$ auxotype (HGH P5/79) could be distinguished from the zero auxotype (HGH Z5/79) by comparing the extent of proline and glucose catabolism. A simple way to trace the more common auxotypic markers, such as proline or arginine, may be by observing their use as an energy source.

Epidemiological studies of gonorrhoea could be helped by a simpler method of distinguishing between clinical isolates. The barium hydroxide indicator system may point to an inexpensive alternative method more amenable to wider use. Other strains should be processed in order to illustrate its applicability. Auxotypes with multiple requirements could also be tested.

We thank Dr Anne Hendry of Hamilton General Hospital, Hamilton, Ontario, for providing the auxotypes.

Yours faithfully,

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References

1. Catlin BW. Characteristics and auxotyping of *Neisseria gonorrhoeae.* In: T Bergan, J R Norris, eds. *Methods in microbiology.* London: Academic Press. 1978; **10**:345-80.

2. Hendry AT, Stewart IO, Auxanographic grouping and typing of *Neisseria gonorrhoeae*. *Can J Microbiol* 1979;**25**:512-21.
3. Carifo K, Catlin BW. *Neisseria gonorrhoeae* auxotyping: differentiation of clinical isolates based on growth responses on chemically defined media. *Applied Microbiology* 1973; **26**:223-30.
4. Catlin BW. Nutritional profiles of *Neisseria gonorrhoeae, Neisseria meningitidis* and *Neisseria lactamica* in chemically defined media and the use of growth requirements for gonococcal typing. *J Infect Dis* 1973; **128**:178-94.
5. Rittenberg SC, Penn CW, Parsons NJ, Veale DR, Smith H. Phenotypic changes in the resistance of *Neisseria gonorrhoeae* to killing by normal human serum. *J Gen Microbiol* 1977; **103**:69-75.
6. Goldner M, Penn CW, Sanyal SC, Veale DR, Smith H. Phenotypically determined resistance of *Neisseria gonorrhoeae* to normal human serum: environmental factors in subcutaneous chambers in guinea pigs. *J Gen Microbiol* 1979; **114**:169-77.
7. Holten E. Glutamate dehydrogenases in genus *Neisseria*. *Acta Pathol Microbiol Scand* 1973; **81**:49-58.
8. Hebeler BH, Morse SA. Physiology and metabolism of pathogenic *Neisseria:* tricarboxylic acid cycle activity in *Neisseria gonorrhoeae*. *J Bacteriol* 1976; **128**:192-201.
9. Umbreit WW, Burris RH, Stauffer JF. *Manometric and biochemical techniques*. 5th ed. Minneapolis: Burgess Publishing Company, 1972.
10. Slifkin M, Pouchet GR. Rapid carbohydrate fermentation test for confirmation of the pathogenic *Neisseria* using a $Ba(OH)_2$ indicator. *J Clin Microbiol* 1977; **5**:15-9.
11. Morse SA, Miller RD, Hebeler BH. Physiology and metabolism of *Neisseria gonorrhoeae*. *In:* R B Roberts, ed. *The gonococcus*. New York: John Wiley and Sons, 1977, 213-53.

Notices

Society for Cutaneous Ultrastructure Research

The 11th Annual Meeting of the SCUR will be held at Helsinki University, Finland, from June 17 to 20, 1984. Dermatologists, pathologists, and other interested scientific workers are invited to participate. For details and registration forms please write to: Dr. Kirsti Maria Niemi, Seccretary of the Organising Committee, Department of Dermatology, Helsinki University Hospital, Snellmaninkatu 14, Helsinki 17, Finland.

Infections of the Genital Tract

The Royal College of Pathologists is arranging a half day (2.00 to 6.00 pm) symposium on infections of the genital tract on Tuesday 17 April 1984 in London. The symposium is open to members of the college, trainee pathologists, and workers in disciplines associated with the subject.

For further information please contact: Christine Peddle, Scientific Meetings Secretary, The Royal College of Pathologists, 2 Carlton House Terrace, London SW1Y 5AF (tel: 01-930 5861).

International Conjoint STD Meeting

to be held on 17-21 June 1984 in Montreal, Quebec, Canada

32nd General Assembly of the International Union against Venereal Diseases and Treponematosis in association with the:

American Venereal Diseases Association,
STD Division of Canadian Public Health Association,
Association of Medical Microbiologists of Canada,
Canadian Infectious Diseases Society,
Canadian Society for Tropical Medicine and International Health, and
L'Association des Medecins Microbiologistes de la Province de Quebec.

Information, registration forms, and abstracts forms obtainable from:
International Conjoint STD Meeting,
c/o Dr Richard Morisset,
739 Dunlop Street, Montreal,
Quebec, Canada H2V 2W5
(Tel: 514-737-9721)

Programme will include the epidemiology, community health and social impact, pathogenesis, biology, diagnosis, management (treatment, follow up, prevention) of STD caused by *Neisseria gonorrhoeae, Treponema pallidum, Chlamydia trachomatis,* genital mycoplasmas, fungal and parasitic agents, viruses (including HSV, CMV, papilloma, hepatitis, etc), and enteric pathogens. Other subjects will include genital ulcers, STD in women (including vaginitis, urethral syndromes, STD in pregnancy, PID, and sterility), neoplasia and STD, STD in developing countries, and AIDS.

Abstracts to arrive by 15 February 1984 from delegates wishing to present papers. They should be typed on official forms in French or English. Papers accepted for verbal (12 minutes) or poster presentation will be printed and distributed at the start of the meeting.

Registration fees: CAN $200.00, for spouse and family member $75.00.
After 1 May 1984 $250.00 for all.

Accommodation booked direct with:
Queen Elizabeth Hotel,
900 West, Dorchester Boulevard,
Montreal, Quebec, Canada H3B 4A5
(Tel: 514-861-3511).

Special flight fares from:
Always Travel,
c/o Norma Rohr,
1260 University, Suite 403,
Montreal, Quebec, Canada H3B 3J8
(Tel: 514-861-8295 or 861-2651).